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# Fabrication of All-Terrain Vehicle

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**Abstract:** This study is aimed to deal with the Fabrication and Testing of an ATV (All-Terrain Vehicle) Frame. An ATV is developed to run on various terrains such as soil, gravel, pebbles, etc. Considering this our major focus was to maintain drivers' safety and better performance of the machine simultaneously. In order to achieve proper parameters, satisfy driver safety, and reduce weight correct alternative of material was required to be concluded. To ensure this, we have conducted several crash tests for drivers' safety and made the required modifications.

## I. INTRODUCTION

ATV, an All-terrain vehicle is manufacture to perform in different types of terrain than other vehicles. The major objective of our project is to fabricate and test an ATV and view its versatility, safety, durability, and high performance like an off-road vehicle. The fabrication of this ATV is based on the principles mentioned in the rule book of SAE BAJA which provides their knowledge in the sector of automotive. We will develop an all-terrain vehicle that meets international standards and is also cost-effective and try to optimize every parameter considering its effects on the performance of another component of the vehicle. Our project is confined only to the fabrication and testing(crash) of chassis (Roll cage), Braking, Steering & Suspension systems of the vehicle.

## II. MATERIAL USED

The material used in the fabrication of this project is AISI 4130 steel . This steel provides the necessary strength. This metal is merged with both iron and carbon elements along with manganese, sulphur chromium, and silicon. Due to its versatile properties. It is dominating in the current market. It is so useful that the American iron & steel industry and Society of Automotive Engineers (SAE) outlined numerous grades of steel that are made for specific purposes and denoted by 3 to 5-digit identifiers. 4130 is commonly used alloy steel.

### A. Physical properties of AISI 4130

4130 steel is the standard name of the material. AISI stands for American Iron and Steel Institute, the first digit i.e. 4 of 4130 alloys indicates the class of steel. The second digit i.e. 1 represents the relative percentage of this alloying element and other important secondary elements present in the material and the remaining last two digits which is 30 represent the carbon concentration. By knowing these rules of 4130 steel, 4XXX & 41XX series (chromium-molybdenum steels)with around 1% molybdenum/chromium by mass with an included 0.30% carbon.

The chemical breakdown for AISI 4130 normalized steel at 870<sup>o</sup>c is given below:

- 1) 0.28 - 0.33% Carbon
- 2) 0.7 - 0.9% Manganese
- 3) 0.8 - 1.1% Chromium
- 4) 0.15 - 0.25% Molybdenum
- 5) ≤ 0.04% Sulphur
- 6) 0.15 - 0.35% Silicon
- 7) ≤ 0.035% Phosphorus

### B. Mechanical Properties OF 4130 Steel Normalized AT 870<sup>o</sup>c

Mechanical properties	Metric
Modulus of Elasticity	220 MPa
Ultimate tensile strength	731 MPa
Tensile yield strength	460 MPa
Rockwell B Hardness	92
Elongation of Break	25.5%

The elastic modulus is a measure of a material's elasticity, it is a common mechanical property which is used to show material stiffness.







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Fig1. plastic model of chassis



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